THE FEASIBILITY OF SMALL NUCLEAR REACTORS IN REMOTE COMMUNITIES OF THE NORTHWEST TERRITORIES

An Interim Statement

Prepared for:
The Legislative Assembly of the
Northwest Territories

by

The Science Institute of the Northwest Territories

June 1986

Uranium As An Energy Source

The technology to control energy released from uranium was developed in 1942. At that time predictions were made that uranium would soon replace coal and oil as the principal energy source for the world. The energy of one pound of uranium was claimed to be equal to 6,000 barrels of oil.[1] By the 1960's, small reactors were being used to produce heat and electricity for scientific camps in Greenland and Antarctica. A very small unit was installed on Axel Heiberg Island to power a remote weather station for a year.

Also during this period, nuclear plants were developed by many countries to produce electrical energy for large cities. Very little attention was given to the use of nuclear energy in remote isolated communities that were becoming more and more dependent on imported fuel to maintain and improve their standard of living.

The SLOWPOKE

In the 1960's, a small team of scientists at Atomic Energy of Canada started to develop a small reactor that slows down automatically if its cooling system becomes too

hot. They called this reactor the SLOWPOKE. The first unit was operated for a year by Atomic Energy of Canada before it was moved to the University of Toronto in May, 1971. It is still operating there for research purposes. Since then, seven more SLOWPOKE reactors have been built for research: AECL in Ottawa (May 1971), University of Montreal (April 1976), Dalhousie University (July 1976), University of Alberta (April 1977), Saskatchewan Research Council (March 1981), University of West Indies in Jamaica (December 1983) and the Royal Military College in Kingston (September 1985). In all cases the reactors are used to produce radiation for analyzing substances for chemical composition. The heat produced by the reactor is collected in a cooling system that releases the heat as warmed air.

Atomic Energy of Canada is currently building a SLOWPOKE II reactor that could, in theory, provide heat and electricity. In such a unit, the heat is to be collected by a cooling system that would take the heat from the reactor and distribute it to buildings by a utilidor system similar to those in Inuvik or Cambridge Bay. This prototype reactor will begin operating at Pinawa, Manitoba in September, 1986.

In planning the study of the SLOWPOKE II reactor, as requested by the Legislative Assembly of the Northwest Territories, the Science Institute of the Northwest Territories decided to evaluate real operating performance and costs rather than theoretical data. These performance data may not be available for another year. In the meantime, however, the Science Institute of the Northwest Territories has been cooperating with other northern agencies in exploring alternative energy forms for Northwest Territories communities. One recent study is relevant to the evaluation of any heating system requiring utilidors.[2] A survey of Northwest Territories communities done for the Department of Public Works and Highways showed that taking heat from the cooling and exhaust systems on NCPC diesel generators for distribution to buildings could be economically feasible in more than twenty communities. In all cases, savings in fuel costs at current prices would pay for the distribution system in less than twenty years. Twenty years is the expected lifetime of a SLOWPOKE II reactor.[3]

When information is available on the cost of the construction and operation of a SLOWPOKE II system, probably in the spring of 1987, the Science Institute of

the Northwest Territories will hopefully be able to determine if the SLOWPOKE II can produce heat and light over its lifetime as safely, economically, cleanly, and reliably as the diesel-electric units that now serve Northwest Territories communities.

References Cited

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2. Dillon Consulting Engineers & Planners 1985. Diesel-Electric Residual Heat Recovery Study. Prepared for the Department of Public Works and Highways, Government of the Northwest Territories. 85 p.

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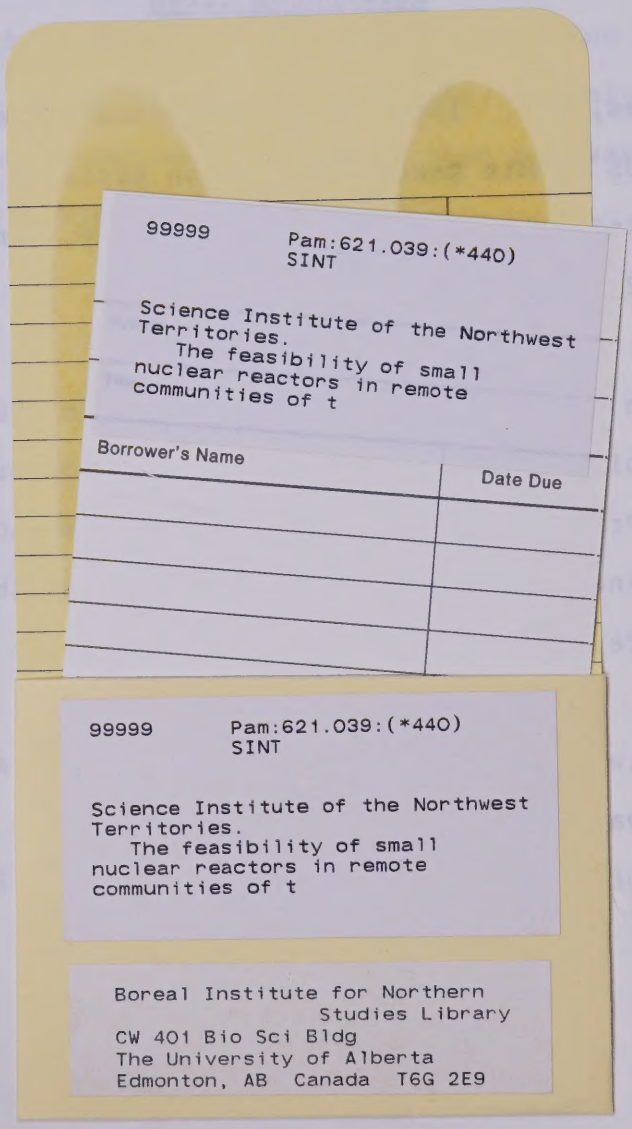

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